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CURRENT INDUSTRIAL REPORTS

Transformers

ORIGINAL

U.S. Department of Commerce
BUREAU OF THE CENSUS

1985

MA36G(85)-1
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SUMMARY OF FINDINGS

IES 719

The statistics in this publication are based on a survey of manufacturers and represent total U.S. shipments of transformers, except fluorescent lamp ballasts and electronic type transformers.

Shipments of power and distribution transformers in 1985 were valued at $1,710 million, representing a 7-percent increase from the $1,603 million in 1984. Specialty transformers were valued at $654 million in 1985, representing a 2-percent increase from the $643 million in 1984. Power regulators, boosters, reactors, and other transformers and parts were valued at $203 million in 1985 representing a 4-percent decrease from the $211 million in 1984.

A description of the survey methodology and related information may be found on page 13.

Table 1. VALUE OF SHIPMENTS OF TRANSFORMERS: 1976 TO 1985

(Millions of current dollars)

Product code	Product description	1985[1]	1984[1]	1983[1]	1982[1]	1981[1]	1980[1]	1979[1]	1978[2]	1977[2]	1976[2]
3612	Transformers	(X)	(X)	(X)	(X)	(X)	(X)	(X)	2,371.1	2,117.8	1,820.5
36122	Power and distribution transformers, except parts	1,710.4	1,603.4	1,406.3	1505.8	1,602.5	1,433.9	1,371.7	1,423.6	1,320.9	1,150.8
36124	Fluorescent lamp ballasts[3]	398.9	392.1	337.4	310.6	327.0	313.5	308.4	231.2	210.7	194.8
36125	Specialty transformers, except flourescent lamp ballasts	654.3	643.2	558.7	559.1	641.5	506.7	478.6	428.0	342.8	284.3
36127	Power regulators, boosters, reactors, and other transformers, including parts and accessories for all transformers	203.0	211.1	192.6	224.1	228.7	239.7	213.2	217.2	168.1	191.8
36120	Transformers n.s.k.	(X)	(X)	(X)	(X)	(X)	(X)	(X)	71.1	75.3	(*)

(*) Withheld because estimate did not meet publication standards. N.s.k. Not specified by kind. (X) Not applicable.

[1] Data for the years 1979-1985 were taken from Current Industrial Reports Series MA36G, Transformers, and MQ36C, Fluorescent Lamp Ballasts.
[2] Data for the years 1976-1978 were taken from the annual survey of manufactures and census of manufactures.
[3] Data for flourescent lamp ballasts are collected on Current Industrial Reports Series MQ36C, Fluorescent Lamp Ballasts.

Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call Jack Matthews, (301) 763-1462.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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Table 2. QUANTITY, VALUE, AND TOTAL KVA CAPACITY OF SELECTED TRANSFORMERS: 1985 AND 1984

(Value in thousands of dollars)

Product code	Product description	Number of companies	1985			1984		
			Quantity[1]	Value	Total kVA capacity (thousands)	Quantity[1]	Value	Total kVA capacity (thousands)
36122 —	Power and distribution transformers, except parts	(NA)	(X)	1,710,438	(X)	(X)	1,603,414	(X)
	Distribution transformers, liquid-immersed, all voltages, and dry-type electric utility distribution transformers, excluding general purpose:							
	Overhead type, single-phase, liquid-immersed:							
36122 01	100 kVA and smaller	25	[a]892.6	424,341	20,882	907.5	425,998	21,416
36122 03	101 kVA through 500 kVA	22	18.5	45,199	4,106	15.4	37,316	3,425
	Compartmentalized pad-mounted, single-phase, liquid-immersed:							
36122 06	100 kVA and smaller	17	198.4	222,615	9,941	221.4	248,482	11,252
36122 07	101 kVA through 500 kVA	15	8.8	20,290	1,448	9.7	22,280	1,664
	Subsurface and subway types, single-phase, liquid-immersed:							
36122 08	100 kVA and smaller	7	15.8	29,361	1,025	16.0	29,631	1,041
36122 09	101 kVA through 500 kVA	6	1.0	3,591	164	0.7	2,421	124
	Three-phase transformers 500 kVA and smaller, liquid-immersed (all voltages):							
36122 12	Overhead type	11	7.4	18,292	685	6.8	15,863	691
36122 13	Compartmentalized pad-mounted	18	42.2	213,456	10,164	37.9	179,615	8,821
36122 15	Subsurface and subway types	4	0.2	1,545	57	[r]2.3	[r]46,381	[r]2,226
36122 35	Network transformers, all ratings, excluding network protectors	4	3.4	76,672	3,443			
	Single-phase, pad-mounted (dry):							
36122 16	50 kVA and smaller	6	49.3	7,994	191	57.4	8,182	233
36122 17	51 kVA through 500 kVA	4						
	Three-phase, pad-mounted (dry):							
36122 18	500 kVA and smaller	9	38.0	29,355	477	33.5	25,575	417
36122 20	501 kVA and larger	6						
	Small power transformers, single- and three-phase, all voltages:							
36122 21	Compartmentalized pad-mounted transformers and subsurface underground and conventional subway type transformers, self-cooled equivalent ratings of 501 kVA through 2,500 kVA, liquid-immersed	14	8,420	107,163	9,996	6,873	85,879	8,013
36122 23	Conventional transformers and autotransformers, with and without load-tap-changing, primary unit substation transformers and single circuit unit substations 501 through 2,500 kVA, liquid-immersed	15	1,422	32,427	2,166	1,824	34,767	3,495
36122 25	Conventional transformers and auto transformers, with load-tap-changing, primary unit substaion transformers and single circuit unit substations 2,501 through 10,000 kVA, liquid-immersed	8	100	10,310	808	105	11,916	892
36122 27	Liquid-immersed conventional transformers and auto transformers, without load-tap-changing, primary unit substation transformers and single circuit unit substaions 2,501 through 10,000 kVA, liquid	14	1,000	54,296	6,316	788	40,920	4,988
36122 29	Dry-type small power transformers, self-cooled equivalent ratings of 501 kVA and above, single- and three-phase high voltage 601 volts and above. Conventional transformers, primary unit substation transformers, and core and coil units	12	1,969	22,081	2,338	1,562	19,384	2,032
	Secondary unit substaion transformers, liquid-immersed, all kVA ratings (based or self-cooled name plate rating); single- and three-phase, all high voltages, and low voltages below 1,000 volts:							
36122 32	Mineral oil and non/low flammability fluids	7	2,889	54,659	4,153	2,162	40,455	3,058
36122 33	Secondary unit substaion transformers, dry type, single- and three-phase, all kVA ratings, all high voltages, and low voltages below 1,000 volts. Units sold with or without secondary switching equipment but with a flange or throat for connection to such equipment (for dry type, also include core and coil units for ultimate use in secondary unit substations)	8	2,322	41,713	3,203	2,046	35,316	2,716
	Large power transformers, liquid-immersed, self-cooled equivalent ratings (based on self-cooled nameplate ratings), 10,001 kVA and larger, single- and three-phase all high and low voltages. Conventional transformers and auto transformers, with and without load-tap-changing primary unit substation transformers and regulating transformers:							
	10,000 kVA, OA-30,000-kVA (50,000 kVA, Top FOA):							
36122 37	With load-tap-changing	9	418	93,094	12,560	298	66,416	8,374
36122 39	Without load-tap-changing	9	320	50,040	8,969	266	43,993	7,390
	30,001 kVA, OA (50,001 kVA, top FOA)-100,000 kVA, OA (167,000 kVA top FOA):							
36122 41	With load-tap-changing	5	49	23,080	14,138	73	27,772	5,598
36122 42	Without load-tap-changing	7	68	24,975	6,738	60	24,886	6,030
	100,001 kVA, OA (167,001 kVA, top FOA) and larger:							
36122 43	With load-tap-changing	4	38	40,597	10,693	27	28,253	7,476
36122 44	Without load-tap-changing	4	57	63,292	22,193	102	101,743	37,068
36125 —	Specialty transformers	(NA)	(X)	654,271	(NA)	(X)	643,174	(NA)
36125 01	Open core and coil units, excluding machine tool control transformers, and all units end-bell enclosed (250 VA and under)	46	6,820.9	57,736	(NA)	7,689.2	60,811	(NA)
36125 03	Machine tool control transformers	32	740.3	26,229	(NA)	793.4	26,033	(NA)
36125 21	Luminous tube transformers for hot and cold operation, 1,000 volts and above	3	1,558.5	29,152	(NA)	1,666.5	29,881	(NA)
36125 31	Ignition, including oil- and gas-furnace ignition applications, but excluding internal combustion engine ignition	6						
	High intensity discharge lamp transformers, also known as ballasts:							
36125 44	Mercury vapor lamp	8	1,557.4	26,513	(NA)	1,245.5	20,071	(NA)
36125 45	Metal halide lamp	8	1,452.2	32,206	(NA)	1,373.6	28,526	(NA)
36125 46	High pressure sodium vapor lamp	7	2,331.1	49,267	(NA)	2,170.4	50,587	(NA)

See footnotes at end of table.

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Table 2. QUANTITY, VALUE, AND TOTAL KVA CAPACITY OF SELECTED TRANSFORMERS: 1985 AND 1984--Continued

(Value in thousands of dollars)

Product code	Product description	Number of companies	1985			1984		
			Quantity[1]	Value	Total kVA capacity (thousands)	Quantity[1]	Value	Total kVA capacity (thousands)
	Specialty transformers--Continued							
	Instrument transformers:							
	Indoor and outdoor current transformers:							
36125 61	600 volts and below	18	706.1	26,727	(NA)	695.2	23,849	(NA)
36125 62	601 through 15,000 volts	10	46.8	9,044	(NA)	33.2	7,906	(NA)
36125 63	15,001 through 69,000 volts	6	3.2	4,832	(NA)	2.8	4,371	(NA)
36125 64	69,001 volts and above	5	0.8	6,361	(NA)	0.7	6,270	(NA)
	Indoor and outdoor voltage transformers:							
36125 65	600 volts and below	11	309.8	4,504	(NA)	r359.0	4,328	(NA)
36125 66	601 through 15,000 volts	8						
36125 67	15,001 through 69,000 volts	5	108.4	27,550	(NA)	103.7	26,378	(NA)
36125 68	69,001 volts and above	3						
	Commercial, institutional and industrial general-purpose transformers, all voltages, single- and three-phase, excluding electric utility distribution transformers:							
36125 71	Single- and three-phase all enclosed general purpose and buck-boost transformers and open core and coil units not included in item codes 36125 01, and 36125 03, 3 kVA and below all voltages	31	b411,373	b22,422	(NA)	444,910	23,940	(NA)
	Single- and three-phase, 3.01 kVA through 15 kVA:							
36125 72	600 volts and below	37	a128,829	a31,053	(NA)	145,722	32,992	(NA)
36125 73	601 volts and above	18	a3,211	a1,642	(NA)	r2,985	1,497	(NA)
	Single-phase 15.01 kVA through 100 kVA:							
36125 74	600 volts and below	29	a16,418	a9,336	(NA)	17,021	9,619	(NA)
36125 75	601 volts through 5,000 volts	20	1,559	4,814	(NA)	1,400	4,130	(NA)
36125 76	5,001 volts and above	13						
	Three-phase 15.01 kVA through 100 kVA:							
36125 77	600 volts and below	32	a75,007	a49,967	(NA)	68,994	43,046	(NA)
36125 78	601 volts through 5,000 volts	18	1,060	747	(NA)	1,792	812	(NA)
36125 79	5,001 volts and above	15	a361	a773	(NA)	r344	r675	(NA)
36125 80	Single-phase 100.01 kVA and above, 600 volts and below	17	920	1,528	(NA)	731	1,053	(NA)
	Single-phase 100.01 kVA through 500 kVA:							
36125 82	601 volts through 5,000 volts	12	a279	b719	(NA)	246	670	(NA)
36125 85	5,001 volts and above	8	223	1,021	(NA)	598	2,221	(NA)
36125 86	Three-phase 100.01 kVA and above, 600 volts and below	28	22,041	41,242	(NA)	19,564	35,791	(NA)
	Three-phase 100.01 kVA through 500 kVA:							
36125 88	601 volts through 5,000 volts	19	a783	a3,592	(NA)	962	4,211	(NA)
36125 91	5,001 volts and above	15	399	2,828	(NA)	401	2,764	(NA)
36125 93	Voltage regulating transformers, except transmission and distribution voltage regulators	21	307,052	a61,335	(NA)	355,051	71,832	(NA)
36125 96	All other transformers, including saturable core reactors	47	7,531,701	121,131	(NA)	9,185,272	118,910	(NA)
36127 --	Power regulators, boosters, reactors, and other transformers, including parts and accessories for all transformers	(NA)	(X)	203,016	(NA)	(X)	211,115	(NA)
	Power regulators, boosters, reactors, and other transformers, including parts and accessories:							
36127 11	Transmission and distribution voltage regulators, single- and three-phase, including induction voltage regulators and step voltage regulators	18	170,503	89,211	(NA)	158,820	91,558	(NA)
36127 31	Reactor and special purpose transformers, liquid-immersed and dry-type all voltages and kVA's such as: Reactors, furnace transformers, rectifier transformers, locomotive transformers, grounding transformers, ground fault neutralizers, mobile transformers, mobile unit substation, and integral single-circuit unit substations	23	(X)	40,759	(NA)	(X)	42,620	(NA)
36127 78	Parts, including renewal and repair parts, (value only) subassemblies and accessories for all transformers	24	(X)	73,046	(NA)	(X)	76,937	(NA)

Note: The percent of estimation of each item is indicated as follows (see "Description of Survey" for a discussion of estimation of missing reports): a10 to 25 percent of this item is estimated. b25 to 50 percent of this item is estimated.

kVA-Kilovolt amperesrating. (NA) Not available. rRevised by 5 percent or more from previously published figures. (X) Not applicable.

[1] For product codes 36122 01 through 36122 20 (distribution transformers) and 36125 01 through 36125 68 (selected specialty transformers) data represent thousands. For other items quantities represent units.

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Table 3. QUANTITY AND VALUE OF SHIPMENTS OF ELECTRONIC TRANSFORMERS, AS PUBLISHED IN CURRENT INDUSTRIAL REPORTS SERIES MA36N(83)-1, SELECTED ELECTRONIC AND ASSOCIATED PRODUCTS: 1985 AND 1984

(Quantity in thousands of units; value in thousands of dollars)

Product code	Product description	Number of companies	1985		1984	
			Quantity	Value	Quantity	Value
36770 —	Coils, transformers, reactors, and chokes for electronic applications	(HA)	(HA)	(HA)	(X)	1,147,843
36770 32	Audio transformers				[a]60,758	[a]242,950
36770 33	Low frequency chokes				10,177	30,422
36770 41	Plate and filament transformers (including auto transformers, except toroidal)				22,924	208,676
36770 61	Pulse transformers, computer, and other types				21,684	115,740
36770 12	RF chokes				122,189	45,637
36770 13	RF coils				85,910	51,769
36770 14	IF transformers				10,927	19,094
36770 71	Television transformers and reactors (horisontal output, vertical deflection, focus coils, deflection yokes, etc.)				6,315	45,912
36770 91	Toroidal windings (transformers and reactors), except complete magnetic amplifiers				[1]28,019	100,906
36770 92	Other (balun coils, permeability tuning devices, etc.)				(X)	286,737

Note: The percent of estimation of each item is indicated as follows (see "Description of Survey" for a discussion of estimation of missing reports): [a]10 to 25 percent of this item is estimated.

(HA) Not available. (X) Not applicable.

[1]Quantity in number of units.

Table 4. COMPARISON OF VALUES OF SHIPMENTS OF TRANSFORMERS, AS REPORTED IN THE MA36G, THE 1984 ANNUAL SURVEY OF MANUFACTURES, AND THE 1982 CENSUS OF MANUFACTURES

(Value in thousands of dollars)

Product code	Product description	1984			1982	
			Annual Survey of Manufactures			
		MA36G	Value	Standard error of estimates[1]	MA36G	Census of Manufactures
3612	Transformers	(X)	2,959.2	(X)	(X)	2,772.6
36122	Power and distribution transformers, except parts	1,603.4	1,724.6	1	1,505.8	1,554.0
36124	Fluorescent lamp ballasts[2]	392.1	397.8	0	310.6	312.1
36125	Specialty transformers, except lamp ballasts	643.2	562.6	1	559.1	545.1
36127	Other transformers, parts for all transformers	211.1	206.6	19	224.1	243.2
36120 00	Transformers n.s.k., typically for establishments with 5 employees or more	[3]	67.6	85	[3]	85.4
36120 02	Transformers n.s.k., typically for establishments with less than 5 employees					32.8

Note: In the 1982 Census of Manufactures, shipments for establishments of small companies, typically those with fewer than five employees for industry 3612, were estimated from administrative records data rather than collected census questionnaires. These shipments are included in product codes 36120 02. Products not adequately identified by detail product were coded in some cases to the appropriate industry (four-digits) followed by "000."

N.s.k. Not specified by kind. (X) Not applicable.

[1]The annual survey of manufactures percentage standard errors shown are the approximate relative errors of the estimates of level. A more detailed description of the standard error of estimate is given in the introduction of the annual survey of manufactures, Value of Product Shipments, MA4(AS)-2, under "Qualifications of the Data."

[2]These data are republished from Current Industrial Reports Series MQ36C, Fluorescent Lamp Ballasts, Summary for 1985.

[3]Available only from the annual survey of manufactures and census of manufactures. Most of these data are derived from administrative records. See note above.

Table 5A. QUANTITY AND VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF TRANSFORMERS: 1985

(Quantity in units, value in thousands of dollars)

Product code	Product description	Manufacturer's shipments		Exports of domestic merchandise[2] [3]			Percent exports to manufacturers' shipments		Imports for consumption[2] [5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity[1]	Value	Quantity[1]	Value	Producers' value[4]	Quantity	Value	Quantity[1]	Value[6]	Quantity[1]	Value	Quantity	Value
	Total transformers	(X)	[8]2,966,620	(X)	188,098	170,192	(X)	6	(X)	293,062	(X)	2,822,711	(X)	10
36122 pt.	Distribution transformers, liquid-immersed, all voltages, and dry-type electric utility distribution transformers, excluding general purpose:													
	Overhead type, single-phase, liquid-immersed:													
36122 01	100 kVA and smaller	892.6	424,341											
36122 03	101 kVA through 500 kVA	18.5	45,199											
	Compartmentalized pad-mounted, single-phase, liquid-immersed:													
36122 06	100 kVA and smaller	198.4	222,615											
36122 07	101 kVA through 500 kVA	8.8	20,290											
	Subsurface and subway types, single-phase, liquid-immersed:													
36122 08	100 kVA and smaller	15.8	29,361											
36122 09	101 kVA through 500 kVA	1.0	3,591											
	Three-phase transformers 500 kVA and smaller liquid-immersed (all voltages):													
36122 12	Overhead type	7.4	18,292											
36122 13	Compartmentalized pad-mounted	42.2	213,456											
36122 15	Subsurface and subway types	0.2	1,545											
36122 35	Network transformers, all ratings, excluding network protectors	3.4	76,672											
	Single-phase, pad-mounted (dry):													
36122 16	50 kVA and smaller	49.3	7,994											
36122 17	51 kVA through 500 kVA													
	Three-phase, pade-mounted (dry):													
36122 18	500 kVA and smaller	38.0	29,355											
36122 20	501 kVA and larger													
36125 pt.	Commercial, institutional and industrial general-purpose transformers, all voltages, single-and three-phase, excluding electric utility distribution transformers:													
36125 71	Single- and three-phase all enclosed general-purpose and buck-boost transformers and open core and coil units not included in item codes 36125 01 and 36125 03, 3 kVA and below all voltages	411,373	22,422	[9]399,285	54,224	49,062	(NA)	4	4,730,010	32,744	(NA)	1,424,931	(NA)	2
	Single- and three-phase, 3.01 kVA through 15 kVA:													
36125 72	600 volts and below	128,829	31,053											
36125 73	601 volts and above	3,211	1,642											
	Single-phase 15.01 kVA through 100 kVA:													
36125 74	600 volts and below	16,418	9,336											
36125 75	601 volts through 5,000 volts	1,559	4,814											
36125 76	5,000 volts and above													
	Three-phase 15.01 kVA through 100 kVA:													
36125 77	600 volts and below	75,007	49,967											
36125 78	601 volts through 5,000 volts	1,060	747											
36125 79	5,001 volts and above	361	773											
36125 80	Single-phase 100.01 kVA and above, 600 volts and below	920	1,528											
	Single-phase 100.01 kVA 500 kVA:													
36125 32	601 volts through 5,000 volts	279	719											
36125 85	5,001 volts and above	223	1,021											
36125 86	Three-phase 100.01 kVA and above, 600 volts and below	22,041	41,242											
	Three-phase 100.01 kVA through 500 kVA:													
36125 88	601 volts through 5,000 volts	783	3,592											
36125 91	5,001 volts and above	399	2,828											
36125 93	Voltage regulating transformers, except transmission and distribution voltage regulators	307,052	61,335											
36125 96	All other transformers, including saturable core reactors	7,531,701	121,131											
36127 --	Power regulators, boosters, reactors, and other transformers, including parts and accessories for all transformers:													
	Power regulators, boosters, reactors, and other transformers, including parts and accessories:													
36127 11	Transmission and distribution voltage regulators, single-and three-phase, including induction voltage regulators and step voltage regulators	170,503	89,211											
	Reactor and special purpose transformers, liquid-immersed and dry-type, all voltages and kVA's such as:													
36127 31	Reactors, furnace transformers, rectifier transformers, locomotive transformers, grounding transformers, ground fault neutralizers, mobile transformers, mobile unit substation, and integral single-circuit unit substations	(X)	40.759	(10)	(10)	(10)	(X)	(NA)	(10)	(10)	(X)	(NA)	(X)	(NA)

See footnotes at end of table 5B.

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Table 5A. QUANTITY AND VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF TRANSFORMERS: 1983--Continued

(Quantity in units, value in thousands of dollars)

Product code	Product description	Manufacturer's shipments		Exports of domestic merchandise[2 3]			Percent exports to manufacturers' shipments		Imports for consumption[2 5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity[1]	Value	Quantity[1]	Value	Producers' value[4]	Quantity	Value	Quantity[1]	Value[6]	Quantity[1]	Value	Quantity	Value
	Power regulators, booster, reactors, and other transformers, including parts and accessories for all transformers--Continued													
	Power regulators, boosters, reactors, and other transformers, including parts and accessories--Continued													
36127 78	Parts, including renewal and repair parts, subassemblies and accessories for all transformers	(X)	73,046	(X)	53,660	48,552	(X)	73	(X)	54,974	(X)	74,360	(X)	74
36125 pt.	Selected specialty transformers:													
36125 01	Open core and coil units, excluding machine tool control transformers, and all units end-bell enclosed (250 VA and under)	6,820.9	57,736											
36125 03	Machine tool control transformers	740.3	26,229											
36125 21	Luminous tube transformers for hot and cold operation, 1,000 volts and above													
36125 31	Ignition, including oil- and gas-furnace ignition applications, but excluding internal combustion engine ignition	1,558.5	29,152											
	High intensity discharge lamp transformers, also known as ballasts:													
36125 44	Mercury vapor lamp	1,557.4	26,513											
36125 45	Metal halide lamp	1,452.2	32,206											
36125 46	High pressure sodium vapor lamp	2,331.1	49,267	8,188.8	57,692	52,200	52	8	78,354.6	121,408	85,871.4	762,732	91	16
36124 --	Fluorescent lamp ballasts[11]	70.1	398,895											
	Instrument transformers:													
	Indoor and outdoor current transformers:													
36125 61	600 volts and below	706.1	26,727											
36125 62	601 through 15,000 volts	46.8	9,044											
36125 63	15,001 through 69,000 volts	3.2	4,832											
36125 64	69,001 volts and above	0.8	6,361											
	Indoor and outdoor voltage transformers:													
36125 65	600 volts and below	309.8	4,504											
36125 66	601 through 15,000 volts													
36125 67	15,001 through 69,000 volts													
36125 68	69,001 volts and above	108.4	27,550											
36122 pt.	Small power transformers, single- and three-phase, all voltages:													
36122 21	Compartmentalized pad-mounted transformers, all subsurface underground and conventional subway type transformers, self-cooled equivalent Ratings of 501 kVA through 2,500 kVA, liquid-immersed	8,420	107,163											
36122 23	Conventional transformers and autotransformers, with and without load-tap-changing, primary unit substation transformers and single circuit unit substations 501 through 2,500 kVA, liquid-immersed	1,422	32,427	2,165	10,997	9,950	22	8	1,328	20,752	9,005	149,345	15	14
36122 25	Conventional transformers and autotransformers, with load-tap-changing, primary unit substation transformers and single circuit unit substations 2,501 through 10,000 kVA, liquid-immersed	100	10,310											
36122 27	Liquid-immersed conventional transformers and auto transformers, without load-tap-changing, primary unit substation transformers and single circuit unit stbstations 2,501 through 20,000 kVA, liquid	1,000	54,296	697	4,814	4,356	63	7	408	8,785	811	68,577	50	13
36122 29	Dry-type small power transformers, self-cooled equivalent ratings of 501 kVA and above, single- and three-phase high voltage 601 volts and above Conventional transformers, primary unit substation transformers, and core and coil units	1,969	22,081											
	Secondary unit substation transformers, liquid-immersed, all kVA ratings (based on self-cooled name plate rating); single- and three-phase, all high voltages, and low voltages below 1,000 volts:													
36122 32	Mineral oil and non/low flammability fluids	2,889	54,659	(10)	(10)	(10)	(NA)	(NA)	(10)	(10)	(NA)	(NA)	(NA)	(NA)
36122 33	Secondary unit substation transformers, dry-type, single- and three-phase, all kVA ratings, all high voltages, and low voltages below 1,000 volts. Units sold with or without secondard switching equipment but with a flange or throat for connection to such equipment (for dry-type also include core and coil units for ultimate use in secondard unit substations)	2,322	41,713											

See footnotes at end of table 5B.

Table 5A. QUANTITY AND VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF TRANSFORMERS: 1985--Continued

(Quantity in units, value in thousands of dollars)

Product code	Product description	Manufacturer's shipments		Exports of domestic merchandise[2 3]			Percent exports to manufacturers' shipments		Imports for consumption[2 5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity[1]	Value	Quantity[1]	Value	Producers' value[4]	Quantity	Value	Quantity[1]	Value[6]	Quantity[1]	Value	Quantity	Value
	Selected specialty transformers--Continued													
	Large power transformers, liquid-immersed, self-cooled equivalent ratings (based on self-cooled nameplate ratings), 10,001 kVA and larger, single- and three-phase all high and low voltages. Conventional transformers and autotransformers, with and without load-tap-changing primary unit substation transformers and regulating transformers:													
	100,001 kVA, OA-30,000 kVA (50,000 kVA, top FOA):													
36122 37	With load-tap-changing	418	93,094											
36122 39	Without load-tap-changing	320	50,040											
	30,001 kVA, OA (50,001 kVA, top FOA) - 100,000 kVA, OA (167,000 kVA top FOA):													
36122 41	With load-tap-changing	49	23,080	26	6,711	6,072	3	2	252	54,399	1,176	342,766	21	16
36122 42	Without load-tap-changing	68	24,975											
	100,001 kVA, OA (16,0001 kVA, top FOA) and larger:													
36122 43	With load-tap-changing	38	40,597											
36122 44	Without load-tap-changing	57	63,292											

See footnotes at end of table 5h.

Table 5B. QUANTITY AND VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF TRANSFORMERS: 1984

(Quantity in units, value in thousands of dollars)

Product code	Product description	Manufacturer's shipments		Exports of domestic merchandise[2 3]			Percent exports to manufacturers' shipments		Imports for consumption[2 5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity[1]	Value	Quantity[1]	Value	Producers' value[4]	Quantity	Value	Quantity[1]	Value[6]	Quantity[1]	Value	Quantity	Value
36122 pt.	Total transformers	(X)	[8]2,849,805	(X)	176,337	159,550	(X)	6	(X)	283,279	(X)	2,731,199	(X)	10
	Distribution transformers, liquid-immersed, all voltages, and dry-type electric utility distribution transformers, excluding general purpose:													
	Overhead type, single-phase, liquid-immersed:													
36122 01	100 kVA and smaller	907.5	425,998											
36122 03	101 kVA through 500 kVA	15.4	37,316											
	Compartmentalized pad-mounted, single-phase, liquid-immersed:													
36122 06	100 kVA and smaller	221.4	248,482											
36122 07	101 kVA through 500 kVA	9.7	22,280											
	Subsurface and subway types, single-phase, liquid-immersed:													
36122 08	100 kVA and smaller	16.0	29,631											
36122 09	101 kVA through 500 kVA	0.7	2,421											
	Three-phase transformers 500 kVA and smaller liquid-immersed (all voltages):													
36122 12	Overhead type	6.8	15,863											
36122 13	Compartmentalized pad-mounted	37.9	179,615											
36122 15	Subsurface and subway types													
36122 35	Network transformers, all ratings, excluding network protectors	2.3	46,381											
	Single-phase, pad-mounted (dry):													
36122 16	50 kVA and smaller													
36122 17	51 kVA through 500 kVA	57.4	8,182											
	Three-phase, pads-mounted (dry):													
36122 18	500 kVA and smaller													
36122 20	501 kVA and larger	33.5	25,575											
36125 pt.	Commercial, institutional and industrial general-purpose transformers, all voltages, single-and three-phase, excluding electric utility distribution transformers:													
36125 71	Single- and three-phase all enclosed general-purpose and buck-boost transformers and open core and coil units not included in item codes 36125 01 and 36125 03, 3 kVA and below all voltages	444,910	23,940	[9]429,932	54,050	48,904	(NA)	4	7,102,766	70,678	(NA)	1,412,595	(NA)	5
	Single- and three-phase, 3.01 kVA through 15 kVA:													
36125 72	600 volts and below	145,722	32,992											
36125 73	601 volts and above	2,958	1,497											
	Single-phase 15.01 kVA through 100 kVA:													
36125 74	600 volts and below	17,021	9,619											
36125 75	601 volts through 5,000 volts													
36125 76	5,000 volts and above	1,400	4,130											
	Three-phase 15.01 kVA through 100 kVA:													
36125 77	600 volts and below	68,994	43,046											
36125 78	601 volts through 5,000 volts	1,792	812											
36125 79	5,001 volts and above	344	675											
36125 80	Single-phase 100.01 kVA and above, 600 volts and below	731	1,053											
	Single-phase 100.01 kVA 500 kVA:													
36125 82	601 volts through 5,000 volts	246	670											
36125 85	5,001 volts and above	598	2,221											
36125 86	Three-phase 100.01 kVA and above, 600 volts and below	19,564	35,791											
	Three-phase 100.01 kVA through 500 kVA:													
36125 88	601 volts through 5,000 volts	962	4,211											
36125 91	5,001 volts and above	401	2,764											
36125 93	Voltage regulating transformers, except transmission and distribution voltage regulators	355,051	71,832											
36125 96	All other transformers, including saturable core reactors	9,185,272	118,910											
36127 —	Power regulators, boosters, reactors, and other transformers, including parts and accessories for all transformers:													
	Power regulators, boosters, reactors, and other transformers, including parts and accessories:													
36127 11	Transmission and distribution voltage regulators, single-and three-phase, including induction voltage regulators and step voltage regulators	158,820	91,558											
	Reactor and special purpose transformers, liquid-immersed and dry-type, all voltages and kVA's such as:													
36127 31	Reactors, furnace transformers, rectifier transformers, locomotive transformers, grounding transformers, ground fault neutralizers, mobile transformers, mobile unit substation, and integral single-circuit unit substations	(X)	42,620	(10)	(10)	(10)	(X)	(NA)	(10)	(10)	(X)	(NA)	(X)	(NA)

See footnotes at end of table.

Table 5B. QUANTITY AND VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF TRANSFORMERS: 1984--Continued

(Quantity in units, value in thousands of dollars)

Product code	Product description	Manufacturer's shipments		Exports of domestic merchandise[2 3]			Percent exports to manufacturers' shipments		Imports for consumption[2 5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity[1]	Value	Quantity[1]	Value	Producers' value[4]	Quantity	Value	Quantity[1]	Value[6]	Quantity[1]	Value	Quantity	Value
	Power regulators, booster, reactors, and other transformers, including parts and accessories for all transformers--Continued													
	Power regulators, boosters, reactors, and other transformers, including parts and accessories--Continued													
36127 78	Parts, including renewal and repair parts, subassemblies and accessories for all transformers	(X)	76,937	(X)	49,540	44,824	(X)	64	(X)	49,115	(X)	80,297	(X)	61
36125 pt.	Selected specialty transformers:													
36125 01	Open core and coil units, excluding machine tool control transformers, and all units end-bell enclosed (250 VA and under)	7,689.2	60,811											
36125 03	Machine tool control transformers	793.4	26,033											
36125 21	Luminous tube transformers for hot and cold operation, 1,000 volts and above													
36125 31	Ignition, including oil- and gas-furnace ignition applications, but excluding internal combustion engine ignition	1,666.5	29,881											
	High intensity discharge lamp transformers, also known as ballasts:													
36125 44	Mercury vapor lamp	1,245.5	20,071											
36125 45	Metal halide lamp	1,373.6	28,526	6,147.5	50,410	45,611	38	7	93,619.5	120,874	103,672.7	751,547	90	16
36125 46	High pressure sodium vapor lamp	2,170.4	50,587											
36124 --	Fluorescent lamp ballasts[11]	67.5	392,072											
	Instrument transformers:													
	Indoor and outdoor current transformers:													
36125 61	600 volts and below	695.2	23,849											
36125 62	601 through 15,000 volts	33.2	7,906											
36125 63	15,001 through 69,000 volts	2.8	4,371											
36125 64	69,001 volts and above	0.7	6,270											
	Indoor and outdoor voltage transformers:													
36125 65	600 volts and below	359.0	4,328											
36125 66	601 through 15,000 volts													
36125 67	15,001 through 69,000 volts	103.7	26,378											
36125 68	69,001 volts and above													
36122 pt.	Small power transformers, single- and three-phase, all voltages:													
36122 21	Compartmentalized pad-mounted transformers, all subsurface underground and conventional subway type transformers, self-cooled equivalent Ratings of 501 kVA through 2,500 kVA, liquid-immersed	6,873	85,879											
36122 23	Conventional transformers and autotransformers, with and without load-tap-changing, primary unit substation transformers and single circuit unit substations 501 through 2,500 kVA, liquid-immersed	1,824	34,767	2,849	11,454	10,364	32	9	1,369	11,846	7,217	121,038	19	10
36122 25	Conventional transformers and autotransformers, with load-tap-changing, primary unit substation transformers and single circuit unit substations 2,501 through 10,000 kVA, liquid-immersed	105	11,916											
36122 27	Liquid-immersed conventional transformers and auto transformers, without load-tap-changing, primary unit substation transformers and single circuit unit sbstations 2,501 through 20,000 kVA, liquid	788	40,920	659	4,359	3,944	74	8	419	4,001	653	52,478	64	8
36122 29	Dry-type small power transformers, self-cooled equivalent ratings of 501 kVA and above, single- and three-phase high voltage 601 volts and above. Conventional transformers, primary unit substation transformers, and core and coil units	1,562	19,384											
	Secondary unit substation transformers, liquid-immersed, all kVA ratings (based on self-cooled name plate rating); single- and three-phase, all high voltages, and low voltages below 1,000 volts:													
36122 32	Mineral oil and non/low flammability fluids	2,162	40,455	(10)	(10)	(10)	(NA)	(NA)	(10)	(10)	(NA)	(NA)	(NA)	(NA)
36122 33	Secondary unit substation transformers, dry-type, single- and three-phase, all kVA ratings, all high voltages, and low voltages below 1,000 volts. Units sold with or without secondary switching equipment but with a flange or throat for connection to such equipment (for dry-type also include core and coil units for ultimate use in secondary unit substations)	2,046	35,316											

See footnotes at end of table.

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Table 5B. QUANTITY AND VALUE OF SHIPMENTS, EXPORTS, IMPORTS, AND APPARENT CONSUMPTION OF TRANSFORMERS: 1984—Continued

(Quantity in units, value in thousands of dollars)

Product code	Product description	Manufacturer's shipments		Exports of domestic merchandise[2] [3]			Percent exports to manufacturers' shipments		Imports for consumption[2] [5]		Apparent consumption[7]		Percent imports to apparent consumption	
		Quantity[1]	Value	Quantity[1]	Value	Producers' value[4]	Quantity	Value	Quantity[1]	Value[6]	Quantity[1]	Value	Quantity	Value
	Selected specialty transformers--Continued													
	Large power transformers, liquid-immersed, self-cooled equivalent ratings (based on self-cooled nameplate ratings), 10,001 kVA and larger, single- and three-phase all high and low voltages. Conventional transformers and autotransformers, with and without load-tap-changing primary unit substation transformers and regulating transformers:													
	100,001 kVA, OA-30,000 kVA (50,000 kVA, top FOA):													
36122 37	With load-tap-changing	298	66,416											
36122 39	Without load-tap-changing	266	43,933											
	30,001 kVA, OA (50,001 kVA, top FOA) - 100,000 kVA, OA (167,000 kVA top FOA):													
36122 41	With load-tap-changing	73	27,772	21	6,524	5,903	3	2	135	26,765	940	313,244	14	9
36122 42	Without load-tap-changing	60	24,886											
	100,001 kVA, OA (16,0001 kVA, top FOA) and larger:													
36122 43	With load-tap-changing	27	28,253											
36122 44	Without load-tap-changing	102	101,743											

(NA) Not available. pt. Part. (X) Not applicable.

[1] See footnote 1, table 3.
[2] For comparison of SIC-based output codes with Schedule B export numbers and TSUSA import numbers see, table 6.
[3] Source: Bureau of the Census report EM 546, U.S. Exports.
[4] These values were derived by use of adjustment factors to exclude freight, insurance, and other charges incurred in moving goods to the port of export. This adjustment is made to convert the values to an approximation of the producers' value of exported goods. Current adjustment factors are based on data for 1983 which are published in Origin of Exports of Manufactured Products, M83(AS)-5, appendix B. The adjustment factor for this report is 0.9048.
[5] Source: Bureau of the Census report IA 245-X, U.S. Imports for Consumption and General Imports and IM 146, U.S. Imports for Consumption.
[6] This dollar value represents the c.i.f. (cost, insurance, and freight) value at the first point of entry in the United States plus U.S. import duties.
[7] Apparent consumption is derived by subtracting exports from the sum of manufacturers' shipments plus imports.
[8] This total does not include electronic type transformers which are collected in Current Industrial Reports Series MA36Q, Semiconductors, Printed Circuit Boards, and Other Electronic Components (Shipments). Since the import and export codes do not identify electronic transformers, comparison between manufacturers' shipments, imports, and exports, at the total level is not precise.
[9] These quantities represent units.
[10] These products are not separately identified in either exports or imports.
[11] These data are republished from Current Industrial Reports Series MQ36C, Fluorescent Lamp Ballasts, Summary for 1985.

Table 6. COMPARISON OF STANDARD INDUSTRIAL CLASSIFICATION BASED CODES, SCHEDULE B EXPORT NUMBERS, AND TSUSA IMPORT NUMBERS: 1985

Product code	Product description	Export number[1]	Product description	Import number[2]	Product description
36125 01	Open cores and coil units, excluding machine tool control transformers, and all units end-bell enclosed (250 VA and under).....				
36125 03	Machine tool control transformers.....				
36125 21	Luminous tube transformers for hot and cold operation, 1,000 volts and above.....				
36125 31	Ignition, including oil- and gas-furnace ignition applications, but excluding internal combustion engine ignition..				
	High intensity discharge lamp transformers, also known as ballasts:	682.6054	Lamp ballasts	682.6054	Lamp ballasts
36125 44	Mercury vapor lamp.....		Transformers		Transformers
36125 45	Metal halide lamp		Rated at less than 1 kVA	682.0520	Rated at less than 40 VA
36125 46	High pressure sodium vapor lamp.....	682.0520	Rated at less than 40 VA	682.0540	Rated at more than 40 VA but less than 1 kVA
36124 --	Fluorescent lamp ballasts.....	682.0540	Rated at 40 VA or more		
	Instrument transformers:				
	Indoor and outdoor current transformers:				
36125 61	600 volts and below.....				
36125 62	601 thru 15,000 volts.....				
36125 63	15,001 thru 69,000 volts.....				
36125 64	69,001 volts and above.....				
	Indoor and outdoor voltage transformers:				
36125 65	600 volts and below.....				
36125 66	601 thru 15,000 volts.....				
36125 67	15,001 thru 69,000 volts.....				
36125 68	69,001 volts and above.....				
	Small power transformers, single- and three-phase (all voltages)				
36122 21	Compartmentalized pad-mounted transformers and subsurface underground and conventional subway type transformers, self-cooled equivalent ratings of 501 kVA through 2,500 kVA, liquid-immersed.....	682.0745	Rated over 500 kVA but not over 2,500 kVA	682.0745	Rated over 500 kVA but not over 2,500 kVA
36122 23	Conventional transformers and autotransformers, with and without load-tap-changing, primary unit substation transformers and single circuit unit substations 501 through 2,500 kVA, liquid-immersed.....				
36122 25	Conventional transformers and autotransformers, with load-tap-changing, primary unit substation transformers and single circuit unit substations 2,501 through 10,000 kVA, liquid-immersed.....	682.0755	Rated over 2,500 kVA but not over 10,000 kVA	682.0755	Rated over 2,500 but not over 10,000 kVA
36122 27	Liquid-immersed conventional transformers and autotransformers, without load-tap-changing, primary unit substation transformers and single circuit unit substations 2,501 through 10,000 kVA, liquid.....				
	Large power transformers, liquid-immersed, self-cooled equivalent ratings (based on self-cooled nameplate ratings), 10,001 kVA and larger, single- and three-phase all high and low voltages. Conventional transformers and autotransformers, with and without load-tap-changing primary unit substation transformers and regulating transformers:				
	10,001 kVA, OA-30,000-kVA (50,000, top FOA):	682.0765	Rated over 10,000 kVA but not over 100,000 kVA	682.0765	Rated over 10,000 kVA but not over 100,000 kVA
36122 37	With load-tap-changing.....				
36122 39	Without load-tap-changing.....	682.0775	Rated over 100,000 kVA	682.0775	Rated over 100,000 kVA
	30,001 kVA, OA (50,001 kVA, top FOA) - 100,000 kVA OA (167.000 kVA top FOA):				
36122 41	With load-tap-changing.....				
36122 42	Without load-tap-changing.....				
	100,001 kVA, OA (167,001 kVA, top FOA) and larger:				
36122 43	With load-tap-changing.....				
36122 44	Without load-tap-changing.....				
36122 20	Three phase, pad mounted (dry) 500 kVA and more.....				
36122 29	Dry-type small power transformers, self-cooled equivalent ratings of 501 kVA and above, single- and three-phase high voltage 601 volts and above. Conventional transformers, primary unit substation transformers, and core and coil units.				
	Secondary unit substation transformers, liquid-immersed, all kVA ratings (based on self-cooled name plate rating): single- and three-phase, all high voltages, and low voltages below 1,000 volts:				
36122 32	Mineral oil and non/low flammability fluids.....				
36122 33	Secondary unit substation transformers, dry type, single- and three-phase, all kVA ratings, all high voltages, and low voltages below 1,000 volts. Units sold with or without secondary switching equipment but with a flange or throat for connection to such equipment (for dry type also include core and coil units for ultimate use in secondary unit substations).....	(3)	(3)	(3)	(3)

See footnotes at end of table.

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Table 6. COMPARISON OF STANDARD INDUSTRIAL CLASSIFICATION BASED CODES, SCHEDULE B EXPORT NUMBERS, AND TSUSA IMPORT NUMBERS: 1985--Continued

Product code	Product description	Export number[1]	Product description	Import number[2]	Product description
	Power regulators, boosters, reactors, and other transformers, including parts and accessories:				
36127 11	Transmission and distribution voltage regulators, single and three-phase, including induction voltage regulators and step voltage regulators				
36127 31	Reactor and special purpose transformers, liquid-immersed and dry-type, all voltages and kVA's such as: Reactors, furnace transformers, rectifier transformers, locomotive transformers, grounding transformer, ground fault neutralizers, mobile transformers, mobile unit substation, and integral single-circuit unit substations				
	Distribution transformers, liquid-immersed, all voltages, and dry-type electric utility distribution transformers, excluding general purpose:				
	Overhead type, single-phase, liquid-immersed:				
36122 01	100 kVA and smaller				
36122 03	101 kVA through 500 kVA				
	Compartmentalized pad-mounted, single-phase, liquid-immersed:				
36122 06	100 kVA and smaller				
36122 07	101 kVA through 500 kVA				
	Subsurface and subway types, single-phase, liquid-immersed:				
36122 08	100 kVA and smaller				
36122 09	101 kVA through 500 kVA				
	Three-phase transformers 500 kVA and smaller, liquid-immersed (all voltages):				
36122 12	Overhead type				
36122 13	Compartmentalized pad-mounted				
36122 15	Subsurface and subway types				
36122 35	Network transformers, all ratings, excluding network protectors				
	Single-phase, pad-mounted (dry):				
36122 16	50 kVA and smaller				
36122 17	51 kVA through 500 kVA		Transformers		Transformers
	Three-phase, pad-mounted (dry):				
36122 18	500 kVA and smaller	682.0730	Rated at 1 kVA or more but not over 100 kVA	682.0720	Rated at 1 kVA or more but not over 50kVA
	Commercial, institutional and industrial general-purpose transformers, all voltages, single- and three-phase, excluding electric utility distribution transformers:			682.0725	Rated over 50 kVA but not over 100 kVA
36125 71	Single- and three-phase all enclosed general-purpose and buck-boost transformers and open core and coil units not included in item codes 2501 and 2503, kVA and below all voltages	682.0735	Rated over 100 kVA but not over 500 kVA	682.0735	Rated over 100 kVA but not over 500 kVA
	Single- and three-phase, 3.01 kVA through 15 kVA:				
36125 72	600 volts and below				
36125 73	601 volts and above				
	Single-phase 15.01 kVA through 100 kVA:				
36125 74	600 volts and below				
36125 75	601 volts through 5,000 volts				
36125 76	5,001 volts and above				
	Three-phase 15.01 through 100 kVA:				
36125 77	600 volts and below				
36125 78	601 volts through 5,000 volts				
36125 79	5,001 volts and above				
36125 80	Single-phase 100.01 kVA and above, 600 volts and below				
	Single-phase 100.01 kVA through 500 kVA:				
36125 82	601 volts through 5,000 volts				
36125 85	5,001 volts and above				
36125 86	Three-phase 100.01 kVA and above, 600 volts and below				
	Three-phase 100.01 kVA through 500 kVA:				
36125 88	601 volts through 5,000 volts				
36125 91	5,001 volts and above				
36125 93	Voltage regulating transformers, except transmission and distribution voltage regulators				
36125 96	All other transformers, including saturable core reactors				
36127 78	Parts (including renewal and repair parts) subassemblies and accessories for all transformers	682.6056	Parts for transformers	682.6056	Parts for transformers

[1] Source: 1983 Edition, Tariff Schedule of the United States, Annotated.
[2] Source: 1983 Edition, Schedule B, Statistical Classification of Domestic and Foreign Commodities Exported from the United States.
[3] See footnote 10, table 5b.

DESCRIPTION OF SURVEY

Scope of Survey. This survey covers manufacturers of power, distribution, instrument, and specialty transformers in the United States. Radio or voice frequency transformers, transformers for electronics applications, and fluorescent lamp ballasts are excluded. Very small companies (generally those with less than five employees) for which data in the 1982 Census of Manufactures were derived from administrative records of other government agencies, are not included in the survey scope.

Survey Methodology. The statistics in this publication were collected by mail on Bureau of the Census annual Form MA36G, Transformers. The survey panel includes all known manufacturers of power, distribution, instrument, and specialty transformers, approximately 155 companies. No estimates are derived for the small firms excluded from the scope of the survey.

Reliability of Data. Survey error may result from several sources: (1) inability to obtain information about all cases in the survey; (2) response errors; (3) definitional difficulties; (4) differences in the interpretation of questions; (5) mistakes in recording or coding the data obtained; and (6) other errors of collection, response, coverage, and estimation for missing data. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is due to imputing data for nonrespondents, for late reporters, and for data which fail logic edits. Missing figures are imputed based on yearly movements shown by reporting firms. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse, because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is not precisely known, but is assumed to be small. The degree of uncertainty regarding the accuracy of the published data increases as the percentage of imputation increases. Figures with imputation rates above 15 percent should be used with caution.

Revisions to Previous Period Data. Statistics for previous years may be revised as the result of corrected data from respondents, late reports for which imputations were made as described above, or other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

Revisions include changes to prior period data resulting from reconciliation of the results of this survey with the 1982 Census of Manufactures to correct differences in reported data between the two series and to identify and verify new establishments included in the scope of this survey. Table 4 presents a comparison of data from the two series by census product class following the reconciliation.

Adjustment for Price Change. All dollar figures included in this publication are in current dollars; i.e., they have not been adjusted for price change.

EXPLANATION OF TERMS

Quantity and Value of Shipments. The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to a company's own branches are assigned the same value as comparable sales to unaffiliated customers; i.e., the value includes an appropriate allocation of company overhead and profit. Products bought and resold without further manufacture are excluded.

COMPARISON OF EXPORT, IMPORT, AND DOMESTIC OUTPUT DATA

The Standard Industrial Classification (SIC) system used for domestic output and the statistical export and import commodity classifications were developed independently. This results in considerable difficulty in comparing the three types of data for many commodity areas. The domestic output classification is based on type of industry; on the other hand, the export and import classification system is more materials oriented. Also, there are a substantial number of imported commodities which have no comparable domestic output classification. The relationships shown in this report should be considered only as approximations, since, in addition to the problems mentioned above, there are also the following problems affecting the comparability of the three sets of data.

Valuation. There are different methods of valuation for the three types of data:

- *Domestic Output*—Valued at the point of production. It includes the net sales price, f.o.b. plant, after discounts and allowances, exclusive of freight charges and excise taxes.

- *Exports*—Valued at the point of exportation. It includes the selling price, or cost if not sold, and inland freight, insurance and other charges to the export point.

  Estimated producers' values of exports have also been developed. These values more closely approximate the values reported for domestic output because they exclude freight, insurance, and other charges applied from the producing plant to the export point.

- *Imports*—Valued at the first port of entry in the United States. It includes c.i.f. (cost, insurance, and freight), duty, and other charges to the import point.

Duplication in Quantity and Value of Output. Because producers' shipments of some commodities may be used as materials for incorporation into other commodities, combinations of data for such commodities may contain a certain amount of duplication. Thus, percentages of exports to output or imports to apparent consumption (output plus imports minus exports) at four-digit or broader levels may be understated. Where duplication is known to be substantial, the output data are appropriately noted in the table.

Low-Value Import and Export Transactions. Detailed commodity information is not included for individual export shipments valued at not more than $1,000. Generally, detailed commodity information is not included for individual import shipments valued at not more than $1,000. For textiles and textile products, gloves, footwear, and miscellaneous rubber and plastics products, detailed commodity information is not included for individual import shipments valued at not more than $250. This is believed to have only negligible effects on the statistics for the bulk of the commodities.

Manufacturers' Shipments, Not Specified by Kind. The value of manufacturers' shipments at the four-digit industry level often includes a small amount which is not distributed among the individual five-digit product classes. Export and import percentages at the more detailed levels might, therefore, be slightly overstated.

Time Lag Between Output and Exports. There will be a lag between the time a commodity is produced or shipped by the producer and the time it is actually exported, especially when intermediaries (wholesalers, exporters, etc.) are involved. Ordinarily, this type of discrepancy is insignificant in annual figures.

"Direct" vs "Total" Commodity Exports and Imports. Export and import data do not include materials which are incorporated into other more finished products and exported or imported in finished form. Thus, by showing only direct exports and imports, the relation of exports to output and imports to apparent consumption for intermediate products is considerably understated.

Used Commodities. With a few exceptions, used or rebuilt commodities are classified in the same import or export codes as is new merchandise. Percentages are thus overstated to the extent that used or rebuilt products are significant in trade.

Geographic Area of Coverage. Import and export data reflect the movement of merchandise into and out of U.S. foreign trade zones, the U.S. Virgin Islands, and the U.S. customs territory (includes the 50 States, the District of Columbia, and Puerto Rico).

HISTORICAL NOTE

Data on transformers have been collected by the Bureau of the Census since 1979. Historical data may be obtained from your local Federal Depository Library. A list of these libraries may be obtained from the Bureau of the Census regional offices:

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